

ENGINEERING DIVISION RECORD COPY

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CONNECTICUT RIVER FLOOD CONTROL

MAD RIVER DAM & RESERVOIR

MAD RIVER, CONNECTICUT

DESIGN MEMORANDUM NO. 3

CONCRETE MATERIALS



U.S. Army Engineer Division, New England
Corps of Engineers Waltham, Mass.

MARCH 1960

ENGCEW-E (24 Mar 60)

1st Ind

SUBJECT: Mad River Dam and Reservoir, Mad River, Connecticut River Basin,
Connecticut, Design Memorandum No. 3 - Concrete Materials

Office, Chief of Engineers, Washington 25, D.C., 13 April 1960

TO: Division Engineer, U. S. Army Engineer Division, New England,
Waltham, Mass.

Approved.

FOR THE CHIEF OF ENGINEERS:



Incl w/d

F. B. SLICHTER
Chief, Engineering Division
Civil Works

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS

424 TRAPELO ROAD
WALTHAM 54, MASS.

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO.

NEDGW

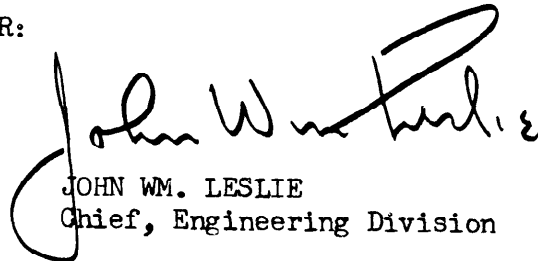
24 March 1960

SUBJECT: Mad River Dam and Reservoir, Mad River, Connecticut
River Basin, Connecticut, Design Memorandum No. 3 -
Concrete Materials

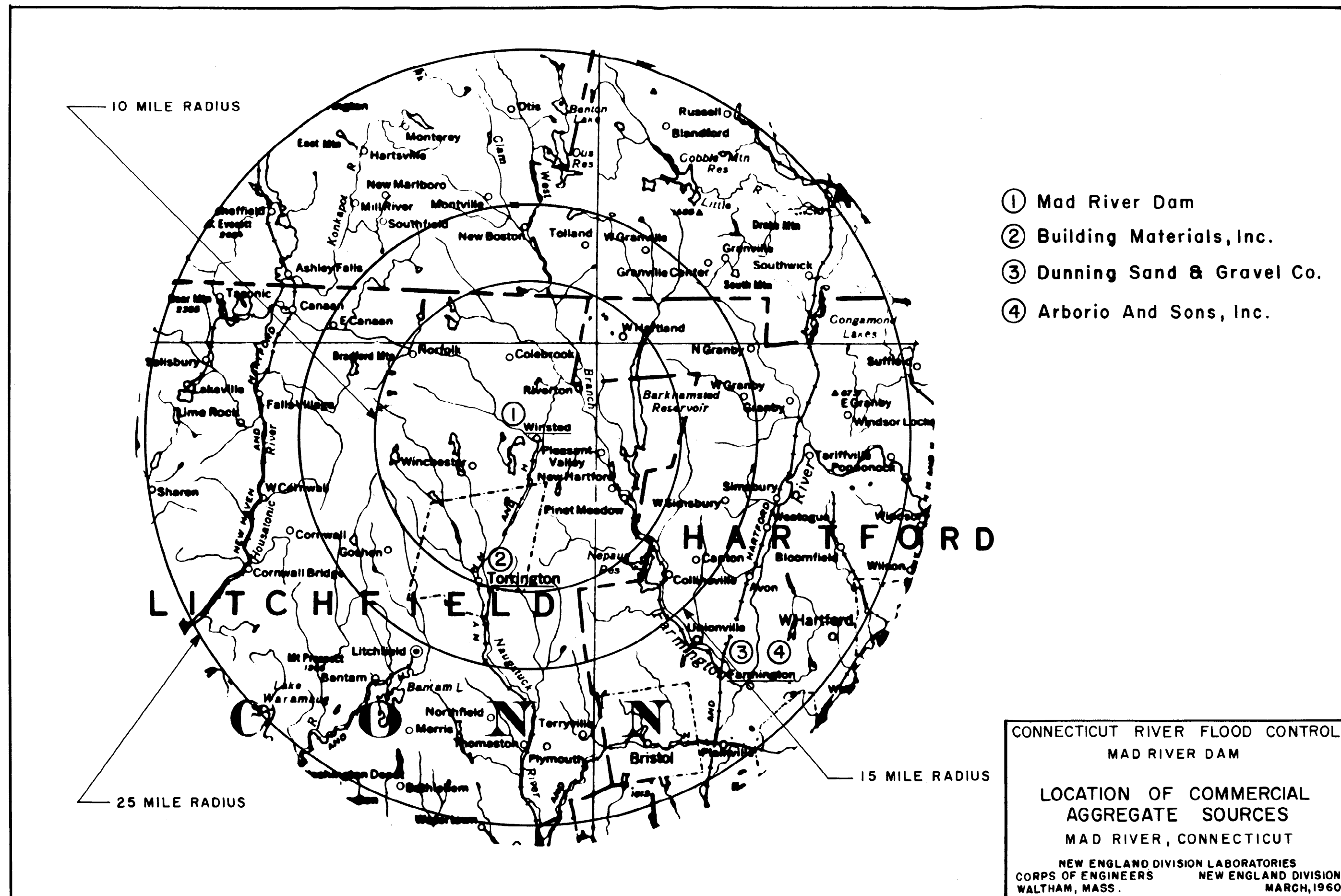
TO: Chief of Engineers
Department of the Army
Washington, D. C.
ATTENTION: ENGCW-E

There are submitted herewith for review and approval
10 copies of Design Memorandum No. 3 - Concrete Materials for
the Mad River Dam and Reservoir, Mad River, Connecticut River
Basin, in accordance with EM 1110-2-1150.

FOR THE DIVISION ENGINEER:


JOHN WM. LESLIE
Chief, Engineering Division

Incl
Des Memo No. 3 -
Concrete Materials
(10 cys)



FLOOD CONTROL PROJECT
MAD RIVER DAM AND RESERVOIR
MAD RIVER
CONNECTICUT RIVER BASIN
CONNECTICUT
INDEX

<u>Design Memo No.</u>	<u>Title</u>	<u>Submission Date</u>	<u>Approved</u>
1	Hydrology and Hydraulic Analysis Preliminary**	22 Jan 1960*	23 Feb 1960
2	Site Geology		
3	Concrete Materials	24 Mar 1960	
4	General Design Memorandum	4 Mar 1960	
5	Embankments and Foundations		
6	Detailed Design of Structures		

*Initial submission in draft to secure approval of spillway design flood, and top of dam elevation.

**Final submission being prepared.

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM 54, MASSACHUSETTS

FLOOD CONTROL PROJECT

MAD RIVER DAM AND RESERVOIR

CONNECTICUT RIVER BASIN

MAD RIVER, CONNECTICUT

DESIGN MEMORANDUM NO. 3

CONCRETE MATERIALS

MARCH 1960

1. General. Approximately 5,700 cubic yards of concrete will be required for the construction of spillway weir, walls, intake structure and conduit of the dam. In view of the small quantity of concrete involved, it is not considered economically feasible to process aggregates on the site; therefore, aggregate investigations have been confined to established commercial sources. All of the three commercial sources within a radius of 25 miles of the project site have been recently investigated and tested. Six additional sources within a thirty-five mile haul distance of the project site were tested and approved for Thomaston Dam, Naugatuck River, Connecticut. These sources will be included in the project specifications as approved sources. Location of the dam site and sources of aggregates are shown on Plate No. III-1.

2. Investigations. Selection of sources for testing was based on plant facilities and characteristics of materials as determined by visual examination and local usage. All of the commercial sources investigated are developed in Pleistocene glacial deposits of sand and gravel and trap rock.

3. Tests. Results of aggregate tests are summarized in Table No. III-1.

4. Relative Cost Estimate. Estimated costs of aggregates from the three sources tested, based on quoted plant prices and Connecticut Department of Public Utilities minimum trucking rates, which are currently 35 cents per ton for each of the first 4 miles and 6 cents per ton for each additional mile, are as follows:

a. The nearest commercial source to the site is Building Materials, Inc., with main pit, processing plant, and transit-mix plant located in Torrington, Connecticut, approximately 10 miles haul

distance from the site. Plant prices for crushed gravel range from \$1.35 per ton to \$2.20 per ton and concrete sand is 90 cents per ton. The delivered price of this material to the site will average \$3.60 per ton for crushed gravel and \$2.66 per ton for concrete sand.

b. The Dunning Sand and Gravel Company, with main pit and processing plant located in Farmington, Connecticut, approximately 22 miles haul distance from the site, produces concrete sand only. The plant price for concrete sand is \$1.00 per ton and the delivered price averages \$3.58 per ton.

c. Arborio and Sons, Incorporated, with main quarry and processing plant located in Farmington, Connecticut, approximately 22 miles haul distance from the site. Plant prices for crushed quarry stone range from \$1.40 per ton to \$2.10 per ton. The delivered price of this material to the site will average \$4.20 per ton.

5. Service Record of Aggregates. Although the concrete aggregates have been used in a number of Federal and State projects, including flood walls, bridges, pavements and other structures, no data are available as to their service behavior over a sufficient period of time to be of value.

6. Conclusions and Recommendations. Based on the data presented herein, it is considered that aggregates from any of the three sources tested are acceptable, and it is recommended that all three sources be approved for fine and/or coarse aggregate, in addition to the sources previously approved for Thomaston Dam.

ITEM	SOURCE AND LOCATION	REMARKS ON SOURCE	HAUL IN MILES	MATERIAL TESTED (PROCESSED)	NOMINAL SIZE	TESTING LABORATORY AND DATE OF TESTS	SAMPLE NUMBER	SIEVE ANALYSIS OF AGGREGATE - U.S. STANDARD SIEVE PERCENT PASSING - BY WEIGHT												FINENESS MODULUS	L.A. ABRASION 500 REV. - % LOSS	SOUNDNESS TEST 5 CYCLES MgSO ₄ % LOSS	ORGANIC IMPURITIES (PPM)	ALKALI REACTIVITY	DELETERIOUS MATERIALS	ABSORPTION PERCENT	SPECIFIC GRAVITY BULK S.S. DRY	LINEAL COEFFICIENT THERMAL EXPANSION x 10 ⁻⁶ /°F	DURABILITY FACTOR (DfE) 300 CYCLES	
								2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100											No. 200
1.	Building Materials, Inc. Torrington, Conn.	Operating Pit in glacial outwash deposits	10	Crushed Gravel	1 1/2"	S. A. D. Jan. 1957	82-443	-	100	42	10	2	-	-	-	-	-	-	-	7.90	46	5.5	-	Innoc	None	0.7	2.68	4.0	74	
3/4"					82-442		-	-	-	100	25	5	3	-	-	-	-	-	6.72											
3/8"					82-441		-	-	-	-	100	94	8	4	-	-	-	-	5.94											
2.	"	"	10	Natural Sand	No. 4	"	82-440	-	-	-	-	-	100	98	83	63	40	17	3	-	2.96	-	9.2	500	Innoc.	None	1.1	2.67	5.4	
3.	Dunning Sand & Gravel Farmington, Conn.	Operating pit in glacial outwash deposits	22	Natural Sand	No. 4	Hub Testing Lab Waltham, Mass.	3-542	-	-	-	-	-	100	97	87	69	51	16	4	-	2.76	-	12	500	-	2.7	1.4	2.66	-	-
4.	Arborio & Sons, Inc. Farmington, Conn.	Operating Quarry	22	Crushed Stone	2"	S. A. D. April, 1949	NED 47-1	95	49	4	2	-	-	-	-	-	-	-	-	-	8.49	12	1.1	-	Innoc.	None	0.6	2.92	3.3	64
					3/4"		NED 47-2	-	-	100	91	16	5	2	-	-	-	-	-	7.86										

PETROGRAPHIC ANALYSIS

1. Stone: Is composed of 77% granite & gneiss, 10% quartz & quartzite, 4% basic igneous rocks, 9% miscellaneous and 11% badly weathered
2. Sand: Is composed of 53% quartz and quartzite, 29% granite and gneiss and 18% miscellaneous rocks and minerals
3. Not available
4. Stone: Composed of feldspar and ores. 55% Laboradorite, 40% Augite, 37% Pyrite, magnetite, Ilmenite and 2% miscellaneous

NOTE: Durability of Arborio & Sons Inc. crushed stone with fine aggregate of John Dunning Sand & Gravel Co., Wauregan, Conn.
All sources were approved for Thomaston Dam, Naugatuck River, Conn. March 1957

CONNECTICUT RIVER FLOOD CONTROL
MAD RIVER DAM

CONCRETE AGGREGATE
INVESTIGATIONS
TEST DATA SUMMARY

MAD RIVER, CONNECTICUT
NEW ENGLAND DIVISION LABORATORIES
CORPS OF ENGINEERS NEW ENGLAND DIVISION
WALTHAM, MASS. MARCH, 1960

TABLE NO. III
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